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ABSTRACT BOOK

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«Geosciences for the environment,
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Secondary minerals in minothem environments

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Secondary minerals forming speleothems are called “cave minerals” and are the results of complex interactions between bedrock, circulating water, and sediments of various sources. A “speleothem” is a secondary mineral deposit formed in a cave by a chemical reaction from a primary mineral in bedrock or detritus because of a unique set of conditions therein. In Carbone et al. (2016) the term “minothems” was defined, for the first time, considering the secondary mineral concretions forming in an artificial underground void, such as a mine or any other kind of tunnel (i.e. roman aqueduct, catacomb, highway tunnel, etc.). These voids can be carved in carbonate rocks, but can also be hosted in different geological materials, such as volcanic rocks, ophiolites or granites. Minothems are the counterpart of speleothems in natural caves, and generally show the same morphologies. However, the petrographical and geological differences of the host rock can cause significant distinctions in mineralogy, colour and shape of the minothems respect to speleothems.

In this work we describe minothems and secondary minerals forming in three abandoned sulphide mines from the Ligurian (Libiola anche Reppia mine) and Piemonte region (Fagnè mine). All studied sites are abandoned and are characterised by active and intense Acid Mine Drainage (AMD) processes triggered by the supergenic interaction between sulphide-rich mineralisations and atmospheric agents. Acid Sulfate Waters (ASW) percolating inside the galleries drip through the mine roof and form numerous decorative dripstone features that coat the walls, ceilings, and floors of the mine, and grow out of muck piles creating a colourful array of white, yellow, orange, green, blue, brown and black minothems. Mine adits host soda straws, stalactites, draperies, stalagmites, columns, flowstones, gourds, but can also contain pearls, rafts, coralloids (popcorn), moonmilk, and helictites. These are often composed of exotic minerals, mainly sulphates (melanterite, langite, brochantite, gypsum, felsöbányaite) silicates (allophane and crisocolla) cuprite and native copper some of which are rather uncommon because of the very special conditions that allowed for their formation in this environment.

Carbone, C., Dinelli, E. & De Waele J. (2016): Characterization of minothems at Libiola (NW Italy): morphological, mineralogical, and geochemical study. *International Journal of Speleology*, 45(2), 171-183.